Claims

1. A tire condition monitoring apparatus for monitoring conditions of tires, the tires including a front tire provided at a front section of a vehicle and a rear tire provided at a rear section of the vehicle, the apparatus comprising:

a plurality of transmitters, each of which is provided in one of the tires, wherein each transmitter includes a condition detecting device for detecting the condition of the corresponding tire, and an acceleration detecting device for detecting the direction of acceleration accompanying rotation of the corresponding tire, wherein each transmitter wirelessly transmits data containing data representing the condition of the tire detected by the condition detecting device and data representing the direction of the acceleration detected by the acceleration detecting device;

a repeater that receives data from the transmitter provided in the front tire or data from the transmitter provided in the rear tire, wherein, when receiving data from any of the transmitters, the repeater wirelessly transmits a response signal when a predetermined period has elapsed after the reception of the data; and

a receiver that receives data from the transmitters and the response signal from the repeater, wherein, based on whether the receiver has received the response signal from the repeater after receiving data from one of the transmitters, the receiver determines the position of the tire in which the transmitter that is the source of the data is provided.

2. The tire condition monitoring apparatus according to claim 1, wherein:

the receiver determines the rotation directions of the tires based on a speed and a moving direction of the vehicle.

3. The tire condition monitoring apparatus according to claim 1, wherein:

based on whether the receiver has received the response signal from the repeater after receiving data from one of the transmitters, the receiver stores information of the position of the tire in which the transmitter is provided.

4. The tire condition monitoring apparatus according to claim 1, wherein:

the repeater is mounted on the vehicle at a position in the vicinity of the tires.

5. The tire condition monitoring apparatus according to claim 1, wherein the receiver determines a speed of the vehicle in accordance with the magnitude of the acceleration data from the acceleration detecting device, and wherein, based on the speed and the moving direction of the vehicle, the receiver determines the rotation directions of the tires.

6. The tire condition monitoring apparatus according to claim 1, wherein, to receive data from the transmitters provided in the front tire or from the transmitters provided in the rear tire, the repeater is located in a front section or in a rear section of the vehicle.

7. The tire condition monitoring apparatus according to claim 1, wherein the vehicle has two front tires and two rear tires, wherein, based on the data representing the direction of the acceleration contained in the data from one of the transmitters, the receiver determines whether the transmitter that is the source of the data corresponds to one of the left tires or to one of the right tires, and wherein, based on whether the receiver has received the response signal from the repeater, the receiver determines whether the transmitter that is the source of the data corresponds to one of the front tires or to one of the rear tires, thereby determining the position of the tire.

8. The tire condition monitoring apparatus according to claim 1, wherein, based on whether the receiver has received the response signal from the repeater after receiving the data representing the direction of acceleration contained in the data from one of the transmitters, the receiver stores information of the position of the tire in which the transmitter is provided.

9. The tire condition monitoring apparatus according to claim 2, wherein the moving direction of the vehicle is based on a signal representing a position of a shift lever.

10. The tire condition monitoring apparatus according to claim 1, wherein the receiver includes a notifying device for notifying a passenger of the positions and the conditions of

the tires.

11. A tire condition monitoring method for monitoring conditions of tires, the tires including front tires provided at a front section of a vehicle and rear tires provided at a rear section of the vehicle, the method comprising:

a first step including a condition detecting step for detecting the condition of each tire, and an acceleration detecting step for detecting the direction of acceleration accompanying rotation of the corresponding tire, wherein data containing data representing the detected condition of the tire and data representing the detected direction of the acceleration is wirelessly transmitted;

a second step, wherein, when a predetermined period has elapsed after the data transmitted in the first step is received, a response signal is wirelessly transmitted; and

a step in which the data of the first step and the response signal of the second step are received, wherein the positions of the tires are determined based on whether the response signal of the second step has been received after the data of the first step is received.

12. The tire condition monitoring method according to claim 11, wherein:

the direction of the acceleration accompanying the rotation of the tire is determined based on a speed and a moving direction of the vehicle.

13. The tire condition monitoring method according to

claim 11, further comprising:

a step in which, after the position of the tire is determined, information of the position of the tire is stored.

14. The tire condition monitoring method according to claim 11, wherein the speed of the vehicle is determined in accordance with the magnitude of the acceleration of the tire, and wherein, based on the speed and the moving direction of the vehicle, the rotation directions of the tires are determined.